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REGISTRATION OF VITAL STATISTICS
IN MICHIGAN.

PAPER READ BEFORE THE

MICHIGAN STATE MEDICAL SOCIETY.

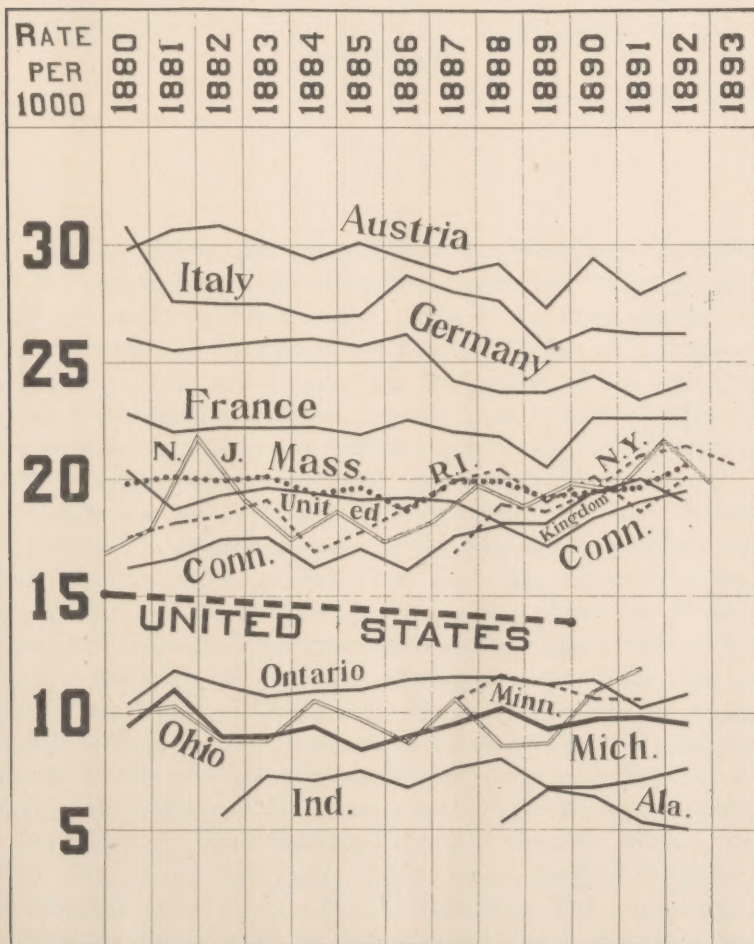
BY

C. L. WILBUR, M. D.,

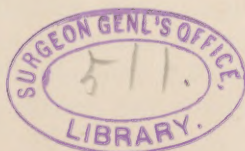
Lansing.



COMPARATIVE MORTALITY



ACCURACY OF REGISTRATION SHOULD ALWAYS BE CONSIDERED IN COMPARING DEATH-RATES.



REGISTRATION OF VITAL STATISTICS IN MICHIGAN.

C. L. WILBUR, M. D.,
Lansing.

I do not believe that it is necessary, in opening the discussion of this subject before this audience, to enter into any extended explanation of the nature and purposes of the State system of registration of vital statistics, nor that it will even be necessary to insist upon the advantages that the people of the State in general, the medical profession, and especially that portion of the profession engaged in public-health work, would derive from well-devised and thoroughly executed registration laws.

These matters were very fully discussed long ago in this Society and in its predecessor, the old State Society, before the war. The present registration law owes its existence to the interest felt in vital statistics by the leading physicians of the State, and expressed by them in frequent papers before the State Association and elsewhere during the years from 1850 to 1870. In a report of the old State Medical Society to the legislature of 1859, I find a resolution offered by Dr. J. H. Beech, of Coldwater, asking that a law for the proper registration of births, marriages, and deaths be enacted; also the report of the "Committee on Vital Statistics," by Dr. Geo. B. Wilson, of Port Huron, to the same effect, and a further "Report on Registration" by Dr. N. D. Stebbins. The presidential address for that year by the distinguished Dr. J. Adams Allen also contained a strong plea for the registration of vital statistics, and, as showing that the physicians of that time had not only a theoretical but practical interest in the registry of deaths and the deductions drawn from their proper compilation, Dr. Beech published tables showing the mortality of Coldwater, together with the meteorological conditions, and observations

thereon, that are remarkable for their completeness and excellent arrangement.

I shall not be able to follow the discussions in the State Societies from this time until the enactment of the first general registration law passed in Michigan, that of 1867. That the medical profession was very influential in obtaining this law, I believe to be true, but that the law itself was not passed in a form that commended itself to the judgment of the best-informed members of the profession at that time, appears from a statement by Dr. Bartholomew before this Society in 1867, who said "that the reason why a better registration law was not passed by the legislature, was, that the members were wholly unacquainted with the needs of the medical profession in this respect." I trust that the legislature at its coming session may be fully aware of the opinion of the State Medical Society in regard to the necessity of a revision of the law, and as to the form that the law should take in order to conform to modern requirements, and hope that a committee will be appointed by you, if thought proper, before the close of this session, to present the subject to the legislature at the proper time.*

There has been, it is true, very little interest in this matter in the Society in recent years—at least so far as I am able to discover by a search of the Transactions for papers relating to vital statistics. For a time (up to 1873) the Society had immediate charge of the editing of the Annual Registration Reports, and a committee was appointed each year for that purpose. In 1873, under the law establishing the State Board of Health, the Secretary of that Board, Dr. Henry B. Baker, who had already, as a representative of the State Medical Society, edited several of the Reports, became *ex officio* Superintendent of Vital Statistics, and continued as such until, by an act of the legislature of 1883, the work was practically withdrawn from all medical supervision. In this gradual way, the

*A committee for this purpose was appointed, consisting of Dr. Leartus Connor, of Detroit, *Chairman*; Dr. W. J. Herdman, Ann Arbor; Drs. Geo. E. Ranney and Henry B. Baker, Lansing; and Eugene Boise, of Grand Rapids.

work has passed from the active interest and co-operation of the State Society and the profession of the State, until to-day there are probably many intelligent physicians in the State who are utterly unaware that such a thing as a State system of registration even exists. For this reason it may not be out of place to give some account of the process of registration under the system that has been in force in this State for over a quarter of a century, before proceeding to the examination of the results obtained by it.

COURSE OF REGISTRATION IN MICHIGAN BY THE PRESENT SYSTEM.

At the present time births, marriages, and deaths are registered in Michigan, or, to speak more accurately, marriages alone are *registered* and births and deaths are *periodically enumerated*. There is a wide distinction between the registration method, whereby, the facts relating to any of the grand events of life are recorded immediately upon their occurrence, and the method of periodical enumeration, or ordinary census method, by which these facts are not recorded for a more or less considerable period thereafter. Upon the selection of the one system or the other largely depends the accuracy and value of the data collected.

Thus marriages have always been immediately recorded, an interval of not more than thirty days being probably the average time of return by the officiating clergyman or justice to the county clerk, even before the law of 1887, by whose provisions a record of the essential facts relating to the bride and bridegroom is required to be made before the license is issued. The returns of marriages have therefore always been very nearly complete in this State, and the statistics relating thereto are far more satisfactory than those of either births or deaths, which are obtained in quite a different manner. It only requires at present that a law for the return of divorces shall be put into operation to place the statistics of Michigan relating directly to the marriage relation on a perfectly satisfactory footing.

As to the registration of births and deaths, the case is very different, and I hope to impress you, for which purpose I have resorted to a graphic representation of the facts in a diagram,* with the large amount of deficiency and with the tardy and unsatisfactory results of the operation of our present law. In the present paper, I shall confine my remarks entirely to the subject of the registration of deaths, as being of more immediate interest to a professional audience, and also as being perfectly representative of the system, births being enumerated at the same time as deaths and by the same officials.

The system of registration of deaths now in operation in Michigan, and under which, in fact, at this very time the enumeration of the deaths that occurred in the State during 1893 is being taken, is that established under an act of the legislature of 1867 as amended by an act of the following session of 1869. This amendatory measure of 1869 has always had the effect of making the registration less perfect than it would have otherwise been under the original law, although by making the registration year identical with the calendar year, as was not at first the case, it possessed some merit.

The process of registration of deaths under the system now in use is substantially as follows: In May of the year following the year for which the enumeration is held, the supervisors of each township and ward in the State attempt to collect particulars relating to all persons who have died in their respective townships or wards during the preceding calendar year. It is, in fact, an ordinary census enumeration of deaths, with this marked disadvantage over even the ordinary census, that the enumeration does not begin until about four months after the close of the year enumerated. For this reason a greater percentage of deficiency and a correspondingly lower death-rate is always indicated by the registration returns for any particular year than by either the State or National censuses, although these are, confessedly, entirely unreliable as evidence of the actual mortality in the State.

The errors that naturally occur in an attempt to make an enumeration of deaths some time after their occurrence depend,

*Not reproduced with this paper.

for the most part, upon lapses of memory in the friends and relatives of decedents, absence of any persons acquainted with the facts in relation to decedents, and also, it must be acknowledged, to lack of interest and proper diligence in making the inquiries prescribed by law on the part of the supervisors, who are burdened with other, and very frequently in their opinions, more important duties relating to the annual assessment which is made at the same time. Hence the inquiries relating to deaths are often made in the most perfunctory manner, if at all, and no pains are taken to elicit definite information in regard to matters of the greatest statistical importance, such as cause of death, in the many cases in which indefinite and unsatisfactory replies are at first given. The failure in this particular point, which makes a very large number of the deaths returned in each year utterly worthless so far as information of medical or sanitary interest is concerned, is only reasonably to be expected under the present conditions since the supervisors have, as a rule, no medical knowledge and are not required by the law to obtain their information from physicians, but only from "persons having a knowledge of the facts."

What is necessary, in order that the State shall collect statistics of medical value, is that the entire enumeration, so far as the statement of the cause of death is concerned, shall be under professional supervision; this would be practically accomplished by requiring the issue of a burial permit in each case based upon a certificate of cause of death from the attending physician, and requiring the return of such certificates from the local registration offices to Lansing, there to be compiled under medical supervision. The first part of this process is already in operation in Detroit and other cities of the State, and it requires only that provision be made for the return and compilation of deaths so registered to fully carry out the intentions of the original law.

After the enumeration by the supervisors, whose return is required to be sent to the clerks of their respective counties by June 1st of each year, a further delay of three months is required by law for these returns to be copied on the records kept at the county seats, and then for a transcript to be made

of this record, which transcript, a *copy* of a *copy* of the supervisors' original return (itself, perhaps, based on hearsay, and more or less incorrect), is finally sent to the Secretary of State and serves as the basis of the statistical work. It is needless to say that from its passage through so many hands, errors are frequent, and medical terms, especially, are often badly mangled.

The county clerk's work on the returns of births and deaths is a sort of registration fifth-wheel that is not only entirely unnecessary, but is responsible for many errors and omissions and impedes the progress of the compilation each year from three to five months. With immediate registration, as full a local registry being preserved as the interests of the township or city may demand, and with the return of the original certificates to the central registration office and their careful preservation and indexing there for the whole State, the need of any intermediate record is not apparent. Thus, a citizen of Detroit who wished to obtain a certified record of any birth or death that had occurred in that city, would consult the registry in the office of the City Board of Health, as at present, or send to the central office at Lansing. The keeping of such a record by the clerk of Wayne county is an unnecessary expense, and such registry, according to experience, is subject to many errors that would not occur in the other plan.

When finally the returns of deaths reach the Secretary of State, where they are permanently preserved after being compiled and indexed, a tedious delay is necessary before the Registration Report can appear, owing to the fact that the returns for the entire year come in together and have to be handled in one mass. Could the same amount of statistical data be received each month, as registered, it would require no larger force of clerks than at present, and the results would be ready for the public very soon after the end of the year.

It is frequently observed that the Vital Statistics Reports are so delayed that the facts contained therein have ceased to be matters of any interest, when finally published, to a large portion of the public, for whose use and benefit they were originally

intended. This is true, but the responsibility should be placed where it belongs as a necessary consequence of the present law.

STATISTICAL VALUE OF THE RESULTS REACHED BY THE
PRESENT SYSTEM OF REGISTRATION.

One of the prime results intended to be reached by the originators of the present law, was the collection of mortality statistics for the State of Michigan that would be readily comparable with those of other States and countries. I quote from the report of the committee on State affairs to the legislature of 1867: "The statistics collected under an efficient registration law would be valuable, *First*: Because from them could be accurately determined the relative standing of our State as to *health*, compared with other States, and the comparative healthfulness of different portions of it." It is a very humiliating commentary on the working of this law designed to establish an efficient and accurate system of vital statistics, that we have never obtained, during the twenty-eight years of its operation, death-rates for the State, hardly even for a single county of the State, that were even approximately accurate and trustworthy. No one knows to-day what is the actual death-rate of the State of Michigan. The State registration, which shows a mortality of from 9 to 10 per 1,000 for ordinary years, is so much below the true rate from the large percentage of omissions as to be altogether unreliable, nor is any additional light thrown upon the subject by the several State and National census enumerations of deaths, which are deficient for similar reasons. In a recent letter, Dr. Billings, Medical Superintendent of the Mortality Statistics of the Eleventh Census, says: "As regards Michigan, I have not attempted to make any correct estimate, the data for this purpose being very deficient."

It would be too sweeping an assertion to say that no results of value have been derived from the present system of registration. The evidence relating to certain minor points of interest in the vital history of the State is nearly as conclusive when based upon partial returns, as if the whole number of deaths could be studied. Thus, as regards average age at death, or

age of greatest mortality from any particular disease, the relative importance of different diseases as causes of death, and to some extent the distribution of mortality through the geographical divisions of the State, many conclusions of undoubted reliability can be drawn from the facts as at present collected, the hypothesis that the deaths returned are fair representatives of the whole number that actually occurred in the State, being always implied. In a still more important particular, the variations in the death-rate in Michigan from year to year, I have no doubt that the series of rates derived from the returns fairly well represents the truth. This is quite confirmed, to my mind, by observing that the principal variations in Michigan closely conform to those noted in other States where accurate registration prevails.

Where the present method fails, and fails utterly to give reliable data, is chiefly in the following very important particulars:

(1) Absolute death-rate, including rate per 1,000 of total deaths to population, rates per 100,000 for special diseases to total population, and the corresponding rates distributed according to sex and age of population;

(2) The distribution of deaths from all causes and from special causes through the months of the year;

(3) The correct return of *causes of death*.

The failure in the first respect is caused by the lapse of time between the occurrence of the deaths and their enumeration; some are forgotten, some the supervisor fails to use the necessary diligence to obtain, and in other cases no person can be found to give the particulars required by law. In one way or another at least two deaths fail to be recorded out of every five that actually occur in the State.

The failure in the second case, relative mortality by months of occurrence, depends upon the fact that the percentage of omissions is higher in those months most remote from the date of enumeration. The returns for December of each year are more nearly correct than those for January of the same year, the former representing a lapse of only four, the latter of sixteen months before enumeration. In consequence of this

any exact comparison of mortality with meteorological conditions is impossible. As an illustration of the great failure of the returns to represent the correct relations of the months of the year in regard to the number of deaths occurring in each, the curve showing the deaths returned for the months of 1890 is a good example. In this year, there was a high death-rate during the early months of the year due to the effects of epidemic influenza, but I am confident that this would never be guessed from the original returns by one unfamiliar with their eccentricities. It is only when large allowance is made for the demonstrated deficiency of the returns and the deaths in the several months are increased in proportion to their remoteness from the time of enumeration, that we begin to approximate to the actual truth and to recognize the peculiar character of the year.

The third, and from a professional standpoint, one of the most important particulars in which the present system fails, is in regard to the satisfactory return of the cause of death. The supervisors are entirely ignorant, as a class, of the meaning and application of medical terms, and the persons from whom they receive their information, the county clerks to whom they report, and, in fact, all the officials concerned, may be equally uninformed. It is not to be wondered at that, under these circumstances, a very large proportion of the returns at present received are utterly valueless from a medical and statistical standpoint. "Weakness," "debility," "heart-failure," "dropsy," "tumor," "lung disease," "liver complaint," etc., etc., are fair examples of returns received every year in large numbers, besides which the causes of nearly ten per cent of all cases are entirely unspecified or "unknown." In Massachusetts the percentage of this class of returns is less than one per cent of the whole. The only remedy for this unsatisfactory state of affairs is to have a physician issue the certificate of death at one end of the line, and to have the returns compiled under medical supervision at the central office. By means of correspondence with the physicians who issued the original certificates in the case of unsatisfactory returns, many mistakes could be corrected and the value of the results reached by the statistical study of causes

of death in this State greatly enhanced. It would also permit primary and secondary causes of death to be distinguished, a matter of very great importance in some cases but which would be quite impossible with the present enumerators.

ESSENTIAL FEATURES OF AN IMPROVED SYSTEM OF
REGISTRATION.

Without attempting to enter into the details of administration, the points that a new registration law should provide for without question, may be briefly stated: These are (1) immediate registration of deaths based upon (2) burial permits and (3) certificates of death. There should be (4) monthly returns from each registration district in the State to the central registration office, (5) monthly reports of mortality issued as soon after the close of each month as practicable, and, finally, (6) an early issue of the Registration Report at a time not more than three months later than the close of the year that the Report covers.

These propositions embrace nothing new or startling in the way of vital statistics registration, but are already in operation in all of their essential particulars in other States, notably in the State of New York, which has had for some years one of the best systems of registration, characterized especially by its promptly issued "Monthly Bulletin of Mortality," anywhere to be found in this country. In Detroit, and in other cities of the State, the proposed system is already in operation in its most important features, and excellent results are being obtained. All that is necessary is to bring the local systems of registration into connection with the State system in these cases, and very few changes will be found necessary in the practical conduct of the work.

Accuracy of registration depends to some extent upon the density of the population of the registration area. In sparsely settled counties, it is much more difficult to secure a full enumeration than in cities, and this should be taken into consideration in grading the compensation of the registrars. Taking the State as a whole, the density of population is double what it was when the old registration law was established, and the State is richer and better able to pay for good work in securing full returns than it was at that time, so soon after the civil war.

Registration districts may probably best be made on the usual city, village and township lines, and the clerks of the cities, villages and townships are, perhaps, the proper officers to act as local registrars. They should issue a burial permit as a necessary preliminary to the interment of every body and receive an adequate compensation for recording and reporting the same — perhaps twenty-five cents on the average for each case. Provision could occasionally be made with advantage for joint-registration districts where the positions of villages and townships would seem to make them desirable. In cities where the City Board of Health already conducts a registration office, the clerk of this board should continue to act as registrar. The essential thing is that throughout the State no burial permit should be issued without an accompanying certificate of the cause of death from the physician last in attendance, or, in case there was no medical attendant, then a certificate from the health officer or coroner, and it should be made punishable by fine or imprisonment for any undertaker, sexton, clergyman, railroad employé, or for the family of the deceased to inter, remove for burial, or assist in the interment or removal of a body, except in accordance with a duly authorized burial permit. Proper provisions could be made for exceptional circumstances or emergencies, such as the absence of the local registrar, etc., so that no hardship could in any case result from the operation of the law.

The value of the certificates of death in relation to the improvement of the mortality statistics, the cause of death being certified to by a qualified physician in each case, has already been alluded to. It may be added that it is of no little legal importance that this should be done and a public record be preserved of the same, and in the case of deaths occurring suddenly or under suspicious circumstances it may be of the greatest public importance.

Lastly, the system of monthly returns and reports will enable the clerks in the central registration office to dispose of the year's work as it arrives in monthly installments, errors and omissions on the part of local registrars can be checked up (eternal vigilance from the central authority is the price of

efficiency in any system), and not least in importance the timely issue of the monthly bulletins and the final report will not only awaken public interest in sanitary matters, but will be of the greatest importance to the sanitary administration of the State by the State Board of Health and local health boards.

Vital statistics is the measure of sanitary progress, enabling the value of improved methods of public-health work to be stated in figures that should admit of no question. Michigan has a position of honor in this country, and indeed throughout the civilized world, from the work accomplished by her State Board of Health. It is to be regretted that the statistical statements by which the success of this work must be largely measured and compared with those of other States and countries should be so self-evidently imperfect as to seriously impair their value and make questionable any arguments into which they are introduced.

It would seem that a revival of interest in the subject of improved registration laws for the several States of the Union and for the country as a whole is being felt among medical men and sanitarians. The time is ripe for it. It has been again fully demonstrated, if any demonstration were necessary, by the results of the last United States census, that ordinary census methods are entirely inadequate to furnish the facts in regard to the vital statistics of the country. In certain cases, and these instances will contribute the most valuable information we have as to the real mortality of the country, the census method has been cut loose from altogether by the authorities in charge of the mortality statistics of the Eleventh Census, and the results of careful local registrations have been studied in its stead. But it is asking too much of the census authorities to require them to study the vital statistics of the whole country with that degree of minuteness that would be possible if the State registration systems were thoroughly organized and doing efficient service. The improvement of the imperfect State systems now in operation, the introduction of approved registration systems into States that at present possess none, the harmonizing and bringing into substantial uniformity of the methods of collection of data and of compilation and expression of the final results,—

these are the first and necessary steps preliminary to a National System of Vital Statistics that will be a credit to this country and do justice to its position among civilized States, and in advancing the interests of our local registration in Michigan, we are working, we may be assured, directly in the line of progress and doing most efficient service towards the attainment of this final result.

Imperfect as they are to-day, these State registration systems are the only means by which we can study the mortality of the United States as a whole as it changes during the years lying between the decennial censuses. The absolute rates, except in certain of the Eastern States, are so faulty as to be of little weight. But assuming that in any State the percentage of omissions is substantially constant from one year to another, the fluctuations in recorded mortality in States having even very imperfect systems of registration ought to correspond on a reduced scale with the variations observed in States having more accurate systems, and the importance of such study, I will again observe, is emphasized from the fact that it is all we have to show the changes in death-rates for the country as a whole.

In the diagram that I have prepared to illustrate this point, the gross mortalities of several States and European countries are compared, and, I believe, the general coincidences of the wave-crests of mortality in the States of this country for the years 1881, 1887-88 and 1890, and in both Europe and America for the year 1890, are sufficiently marked. In the latter case, the sharp rise in Europe from epidemic influenza appears to be followed by a decline for the following year, whereas for this country the death-rates continue to rise during 1891 and 1892. In referring to this diagram, the caution "Accuracy of registration should always be considered in comparing death-rates" must be borne in mind, and it should be further considered that the age and sex constitution of a population is a very important factor in its death-rate, and that corrections for these, even in the cases of the European death-rates, cannot at present be applied.

A point of interest in the comparison of the changes in mortality rates of the several States represented with the change in

the rate of the United States as a whole, as indicated by the registered deaths of the Tenth and Eleventh Censuses, is that instead of showing a decrease from 1880 to 1890, a constant rate, or possibly a slight increase in mortality is indicated. In this case, the inferences derived from a study of the rates of the different states probably stand closer to the truth than the indications of the census enumeration, and fully corroborate the opinion of Dr. Billings, who states that "as the result of several different calculations . . . I have concluded that the death-rate for the whole United States in 1890 was about 18 per 1,000, or about the same that it was in 1880."

To conclude, for I am afraid that I have already unduly trespassed on your patience in attempting to explain the present status of a very "dry" subject, vital statistics, in this State, it is time that Michigan made a fresh effort if she desires to regain the advanced position that she once occupied in this kind of work. All of the States that have long had satisfactory systems continue them with increased efficiency from year to year. This year, Maine issues her first Registration Report, thus making the roll of the New England States complete. Across the continent, the State of Washington has begun to duly record these important facts, and Minnesota, Florida, and West Virginia have been added to the list of registration States within a few years. California has greatly improved her system by the enactment of laws of greater stringency as regards the requirement of burial permits in all parts of the State, and New York, long absent from the list, after the failure of the old plan adopted in 1847 to give satisfactory results, has come grandly to the front with probably the most practically useful system in the country. Michigan, and some other States having a periodical enumeration, or else poorly paid and more or less voluntary systems, remain in the background. It is time that we joined the movement and began to improve our registration laws so that they shall fairly represent modern methods, if we desire to retain the character of an intelligent and progressive State. To you, gentlemen of the State Medical Society, more than to any other class of the community, it belongs to take the initiative in this matter, to exert your personal influence and to educate the

people with whom you come into contact, so that this result may be brought about, and, looking back upon the early interest of the Society in vital statistics, and its very influential part in the establishment of the system now in use, I have no doubt that this duty, once fairly undertaken by you, will be ably and effectually carried out.

EXPLANATION OF DIAGRAM.

In the following table may be found the death-rates represented for the various States and Countries from 1880 to 1892. The authority for the European rates is the table of international statistics published in the latest English Registrar-General's Report (London, 1894.) For Massachusetts, the death-rates are those given by the "Standard Table," issued by Dr. S. W. Abbott, Secretary of the State Board of Health. The rates for Rhode Island are those stated in the Fortieth Annual Registration Report, page 150, excepting only the year 1890, for which the rate should be 20.1 instead of 20.7, as printed. Massachusetts and Rhode Island are the only States for which a series of vital rates can be obtained for successive years of registration, based upon carefully estimated populations for inter-census years, from their official publications. In all other cases the registered number of deaths for each year was obtained from the Registration Reports, or from special lists kindly supplied by the officer in charge of vital statistics in each State.* Series of populations were then calculated for inter-census years, based on the populations stated for 1880 and 1890 by the Compendium of the Eleventh Census, Part I, using also the State censuses (1885) when such were taken. The method of calculation assumed that the total gain of population between censuses was equally distributed among the inter-census years. For Michigan, and probably for many other States of this country, in which immigration is nearly as large an element of growth as natural increase, this method is more correct than the usual assumption that population increases in geometrical ratio. For Ontario, the provincial censuses of 1881 and 1891 were used. In all cases, except Ontario and the United States census, still-births are not included in deaths for the purpose of this comparison.

*It was not thought necessary to insert the table, showing the numbers registered for each year upon which the table of rates is based, in this paper; full data, together with corresponding figures for certain important individual causes of death, as consumption, typhoid fever, etc., will be found in the Twenty-Sixth Annual Registration Report of Michigan, now in preparation, and which may be obtained from the Secretary of State.

DEATH-RATES PER 1,000 LIVING POPULATION.*

COUNTRIES AND STATES.	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893
Austria.....	29.8	30.6	30.8	30.1	29.4	30.1	29.4	28.9	29.2	27.8	29.4	27.9	28.8	...
France.....	22.8	22.0	22.2	22.2	22.2	21.9	22.5	22.0	21.8	20.5	22.6	22.6	22.6	...
Germany.....	26.0	25.5	25.7	25.9	26.0	25.7	26.2	24.2	23.7	23.7	24.4	23.4	24.1	...
Italy.....	30.8	27.6	27.5	27.5	26.9	27.0	28.7	28.0	27.6	25.6	26.4	26.2	26.2	...
United Kingdom.....	20.4	18.7	19.3	19.6	19.4	19.1	19.2	19.0	18.1	18.1	19.4	20.0	19.0	...
United States.....	15.1	...	...	...	...	...	...	...	...	14.0	...	...	...	...
Alabama.....	...	...	...	...	...	...	...	...	5.3	6.7	6.4	5.3	5.0	...
Connecticut.....	16.2	16.6	17.4	17.5	16.2	17.0	16.1	17.5	18.0	17.1	18.3	19.0	19.5	...
Indiana.....	...	...	5.6	7.3	7.1	7.5	6.8	7.6	8.0	6.8	6.8	7.1	7.6	...
Massachusetts.....	19.8	20.1	19.9	20.1	19.4	19.6	18.6	19.9	19.9	19.2	19.4	19.6	20.6	...
Michigan.....	9.4	11.0	9.0	9.0	9.4	8.4	9.0	9.5	10.2	9.3	9.7	9.8	9.5	...
Minnesota.....	...	...	...	...	...	...	...	10.5	11.6	11.2	10.6	10.6	...	...
Ohio.....	18.0	10.3	8.8	8.8	10.5	9.7	8.7	10.6	8.6	8.7	10.9	11.9	...	...
New Jersey.....	16.8	17.9	21.8	19.1	17.4	18.6	17.3	18.1	19.7	18.8	19.8	19.5	21.6	19.8
New York.....	...	...	...	...	...	...	...	16.8	18.9	18.6	19.5	21.0	21.4	20.6
Rhode Island.....	17.5	18.1	18.4	19.1	16.9	17.7	18.8	19.9	20.4	19.0	20.1	18.6	20.1	...
Ontario.....	10.4	11.8	11.2	10.7	10.9	11.0	11.4	11.5	11.5	11.2	11.4	10.2	10.8	...

"ACCURACY OF REGISTRATION SHOULD ALWAYS BE CONSIDERED IN COMPARING DEATH-RATES."

This caution is necessary to any proper and intelligent use of a diagram representing death-rates based upon very different forms of registration. The rates for the European countries and for the Eastern and Middle States represent a much more perfect system of registration of deaths than the rates for the Western States. There is a curious grouping of the Eastern and Western States shown near the lines representing annual death-rates of 20 and 10 per 1,000 population, respectively, no States appearing to hold an intermediate position. The registration is either very good or very bad. The system in all of the Eastern States includes an immediate registry of deaths; in the Western States, either an enumeration is made after the close of the year (Michigan, Ohio), or if deaths are required to be immediately reported, the law is neglected by physicians and others (Indiana), or the registration appears to depend upon the voluntary efforts of the medical profession (Alabama). In Minnesota, the law appears to have some effective provisions, but the county death rates are very low in many cases, probably showing defective returns. California, not represented on the diagram, shows nearly the same mortality as Minnesota, but the new registration law has not been in operation sufficiently long to fully deter-

* Death-rates for census years in **black type**. Still-births are not included in the rates except for Ontario and the United States censuses. The registration year of Indiana ends on September 30, that of Ohio on March 31, and of New Jersey on June 30. In the diagram and table the statistics of Indiana and Ohio are placed in the calendar year to which they chiefly belong. The rates given for New Jersey in the table for 1893, for example, should be understood to represent the year 1892-93, and are so shown in the diagram. In all other cases the registration years are calendar years.

mine its efficiency. In Ontario, the defective returns seem to arise from carelessness on the part of the local registrars due to inadequate compensation, as stated by Inspector Hamilton in the report of 1891.

In spite of the large percentage of omissions in the registration of deaths in the Western States, there will be found many agreements in their variations from year to year with the results of more perfect registration in the East and in Europe. As to the latter, the general rise in death-rates in 1890 from epidemic influenza is well marked, and also the fact that while the rates declined in Europe for the following years, 1891, 1892, a continued higher mortality prevailed in this country. In like manner the year 1881 and the years 1887-88 were years of greater mortality than usual in this country. Space cannot be taken here to consider the reasons for the increased death-rates in these years, but *the fact should be emphasized that upon such comparative study of our State registration systems, imperfect as they are, nearly all our knowledge of the vital statistics of the United States as a whole during inter-census periods depends.* Indeed, the indications from such study are more correct than the inferences from the mortality statistics of the census, which would indicate that the death-rate in this country had diminished from 1880 to 1890. The comparative study of State statistics shows that the mortality has been nearly stationary, or has slightly risen during that period, and this result is fully corroborated by Dr. Billings' opinion as to what the mortality would be if fully registered.

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*From the latter, figures were obtained that exceed for certain years those taken from the annual reports and shown in the diagram for New York. The chief difference is for 1890, for which year the death-rate should be increased nearly 1 per 1,000. There were also estimates of additional deaths occurring in towns not making returns (10,000 for 1887), but these are properly omitted, as the object of the diagram is to show only the actual results of registration.

